

ON SOME SPECIES OF PARASITIC WORMS  
IN THE 'DISCOVERY' COLLECTIONS  
OBTAINED IN THE YEARS 1925-1936



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*Pp. 51-65; 20 Text-figures*

BULLETIN OF  
THE BRITISH MUSEUM (NATURAL HISTORY)  
ZOOLOGY

Vol. 21 No. 3

LONDON: 1971

THE BULLETIN OF THE BRITISH MUSEUM  
(NATURAL HISTORY), *instituted in 1949, is  
issued in five series corresponding to the Departments  
of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become  
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hundred pages, and will not necessarily be completed  
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*This paper is Vol. 21, No. 3 of the Zoological  
series. The abbreviated titles of periodicals cited follow  
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*World List abbreviation  
Bull. Br. Mus. nat. Hist. (Zool.).*

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TRUSTEES OF  
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued 10 September, 1971*

*Price 60p*

# ON SOME SPECIES OF PARASITIC WORMS IN THE 'DISCOVERY' COLLECTIONS OBTAINED IN THE YEARS 1925-1936

By S. MARKOWSKI†

## MATERIAL AND METHODS

THE collection described below was made by 'Discovery' expeditions between the years 1925 and 1936 and consists of twenty-three samples of parasitic worms taken from the muscles and mesenteries, but mostly from the intestinal tract, of four species of fish (*Euthynnus pelamis*, *Coryphaena* sp., *Chionocephalus aceratus* and *Notothenia rossi*), two species of birds (*Phoebetria fusca* and *Chloephaga picta leucoptera*), two species of seals (*Leptonychotes weddelli*, *Hydrurga leptonyx*) and a blue whale (*Balaenoptera musculus*). The material from seals was collected from six specimens of *Leptonychotes weddelli* and ten of *Hydrurga leptonyx*.

In the material studied, twelve separate species of parasitic worms have been recognized. Of these, two forms of Cestodes seem to represent new species. In three cases, because of the juvenile condition of the specimens, generic determination only was possible.

The bulk of the material was preserved in 4% formalin. Some specimens were prepared as whole mounts, having been stained with Mayer's paracarmine. Serial sections, cut at 8  $\mu$ m thick, were stained with Ehrlich's haematoxylin and counter stained with erythrosin. The hosts were taken at localities in the Southern Ocean, the precise localities are given with details of each particular species of parasite.

The author takes this opportunity in expressing his thanks to the National Institute of Oceanography for entrusting this material to him and for providing the necessary scientific apparatus.

Thanks are also due to Dr J. P. Harding, Keeper of the Zoology Department of the British Museum (Natural History) for providing the writer with accommodation and the loan of microscopical equipment, and to Mr S. Prudhoe, Mr J. W. Coles and Mr R. A. Bray of the same Museum for their assistance in the course of this investigation, as well as to Professor J. G. Baer, who kindly lent the original material of *Hymenolepis bisaccata* Fuhrmann, 1906 for comparison.

†Dr. Markowski died January 5, 1971

TABLE I  
List of hosts and their parasitic worms

Species of hosts	No. of hosts examined	Species of Trematodes	Species of Cestodes	Species of Nematodes	Species of Acanthocephala
<i>Euthynnus pelamis</i>	1		<i>Tentacularia</i> <i>sp. larvae</i>		
<i>Coryphaena</i> <i>sp.</i>	1		<i>Bothriocephalus</i> <i>janickii sp. nov.</i>		
<i>Chaenocephalus aceratus</i>	1			<i>Contracaecum</i> <i>sp. larvae</i>	
<i>Notothenia rossi</i>	1				<i>Corynosoma hamanni</i> <i>larvae</i>
<i>Phoebetria fusca</i>	1		<i>Tetrabothrius heteroclitus</i>		
<i>Chloephaga picta leucoptera</i>	1		<i>Hymenolepis prudhoei sp. nov.</i>		
<i>Balaenoptera musculus</i>	1		<i>Diplogonoporus balaenopterae</i>		
<i>Leptonychotes weddelli</i>	6	<i>Ogmogaster antarctica</i>	<i>Diphylobothrium lashleyi</i> <i>Glandicephalus perforatus</i>	<i>Contracaecum osculatum</i>	
<i>Hydrurga leptonyx</i>	10		<i>Diphylobothrium quadratum</i>	<i>Contracaecum osculatum</i>	

## ABBREVIATIONS USED IN THE FIGURES

c	cuticula	t	testis
c.s.	cirrus-sac	u	uterus
ex	excretory vessel	v	vagina
l.m.	longitudinal muscles	v.d.	vas deferens
m.ex.	median excretory vessel	v.g.	vitelline glands
o	ovary	v.s.	vesicula seminalis
s.m.	subcuticular muscles		

## SYSTEMATIC NOTES

The material examined contains twelve species of parasitic worms belonging to four different groups and these are enumerated below.

## I. TREMATODA

## NOTOCOTYLIDAE Lühe, 1909

1. *Ogmogaster antarctica* Johnston, 1931

Host: *Leptonychotes weddelli*, intestine. Locality: Falkland Islands 15.7.1928.

Several specimens of this trematode were found in the intestine of two Weddell seals. In one case they were attached to the walls of the intestine close to strobilae of *Glandicephalus perfoliatus*.

Descriptions of this trematode have been given by Johnston (1931 and 1937).

## II. CESTODA

## TENTACULARIIDAE Poche, 1893

2. *Tentacularia* (larvae)

Host: *Euthynnus pelamis*: cysts in the abdominal muscles. Locality: 15°10'N; 18°30'W; 15.10.1925.

Some six specimens are here recorded. Similar larval stages of a tetra-rhynch were described from the same host-species by Rennie and Reid (1912).

## DIPHYLLOBOTHRIIDAE Lühe, 1910

3. *Diphyllobothrium lashleyi* (Leiper and Atkinson, 1914)

Host: *Leptonychotes weddelli* intestine. Localities: Falkland Island, and Grytviken, South Georgia; 15-17.7.1928.

Great numbers of specimens were obtained from each of three seals.

4. *Diphyllobothrium quadratum* (v. Linstow, 1892)

Host: *Hydrurga leptonyx*, small intestine and rectum. Localities: Grytviken, South Sandwich Islands; South Orkney; 15.9, 18-22.1.1928 : 16.2.1931. The material was collected from ten seal-hosts, each showing a very heavy infestation.

5. *Diplogonoporus balaenopterae* Loennberg, 1892

Host: *Balaenoptera musculus*, intestine. Locality: 61°53'S, 87°32'E, 27.1.1936 ('Southern Empress'). Large portions of strobila and few smaller fragments were found in this sample.

6. *Glandicephalus perfoliatus* (Railliet and Henry, 1912)

Host: *Leptonychotes weddelli*, intestine. Localities: Falkland Islands, 15.7.1928; Palmer Archipelago, 8.1.1935.

Parts of the duodenum of two seal-hosts were found infested with this species. Detailed descriptions of the above-mentioned diphyllbothriid cestodes have been given in earlier papers (Markowski, 1952 and 1955).

## PTYCHOBOTHRIIDAE Lühe, 1902

7. *Bothriocephalus janickii* sp. nov. Figs 1-5

Host: *Coryphaena* sp.; stomach. Locality 24°05'S, 15°46'N. 27.11.1925.

Some twenty-one fragments and eight complete worms were examined. The strobila is about 8 cm long and very slender, about 1 mm broad. The scolex is very large in relation to the rest of the body, being 5 mm long and 1 mm broad. It is provided with a pair of groove-like bothridia. A neck was not observed (Fig. 1).

The excretory system consists of two pairs of longitudinal vessels, two individual canals at either side of the body. Of each pair the outward or dorsal vessel is about  $5 \times 5 \mu\text{m}$  in diameter and the inward or ventral vessel about  $22-27 \mu\text{m} \times 14-21 \mu\text{m}$ . Another single median longitudinal canal of about  $11-13 \times 5-10 \mu\text{m}$  is situated at the right side of the cirrus-sac and the uterine opening. Its walls are thick and provided with cells arranged radially, as seen in the Figs 2 and 3.

The longitudinal musculature consists of a very thin layer of fibres lying immediately beneath the body-cuticula and two well-developed layers of fibres inserted in the parenchyma (Fig. 4). The cuticula is about  $3-5 \mu\text{m}$  thick.

The sexually-mature segment is from 0.87 mm to 0.9 mm broad, as measured in transverse section. The genital pore, situated dorsally, leads into a shallow

genital atrium. The cirrus-sac, measured in the same place, is  $160\ \mu\text{m}$  high and  $84\ \mu\text{m}$  broad, elongate, pyriform and situated dorsally (Fig. 2). There appear to be about 75 testes, but a more precise number, it has not been possible to determine. They are arranged in a single layer in the central part of the segment and measure about  $40\text{--}50 \times 30\text{--}35\ \mu\text{m}$  (Fig. 5).

The ventrally-situated tocostoma or uterine pore leads into an atrium, which as measured in transverse section is  $68\ \mu\text{m}$  high and  $40\ \mu\text{m}$  wide (Fig. 3).

The vitelline glands are disposed ventrally in a single layer between the longi-

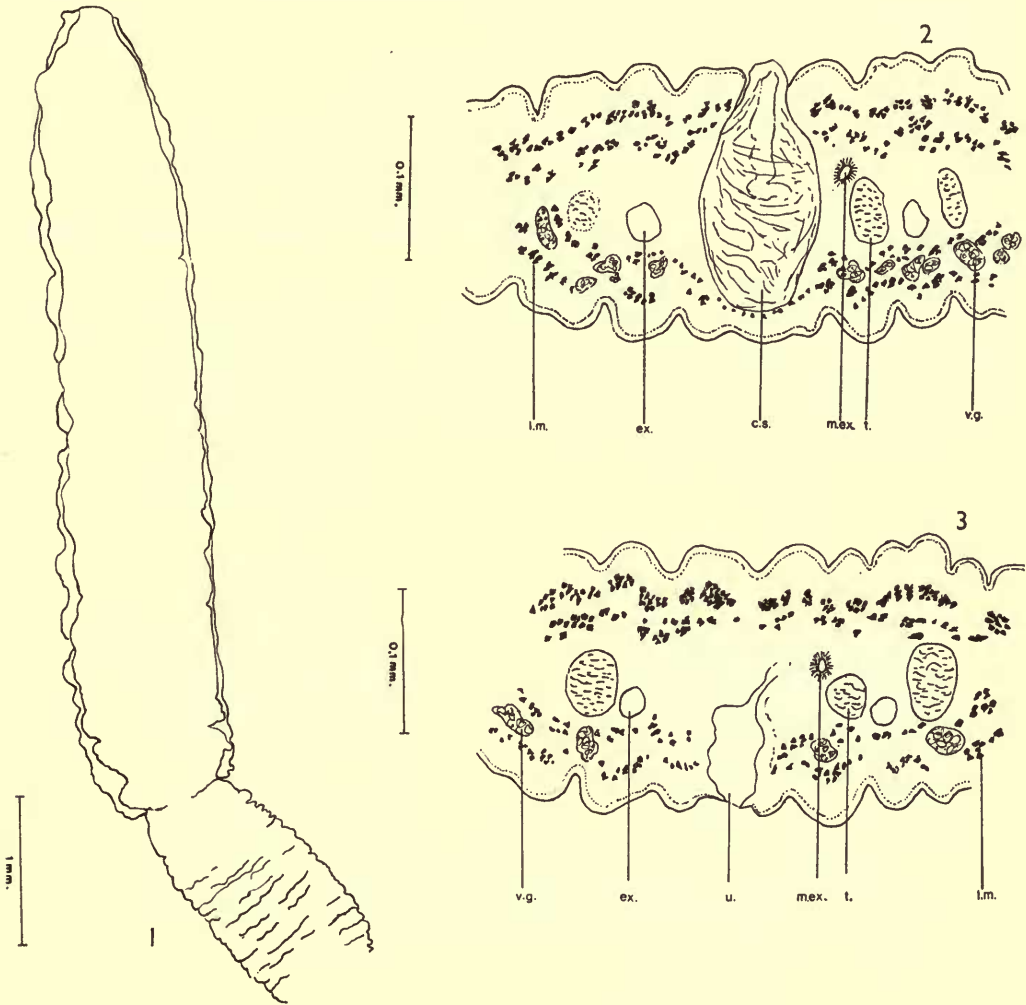


FIG. 1. *Bothriocephalus janickii* sp. nov.: scolex.

FIG. 2. *Bothriocephalus janickii* sp. nov.: cross-section of the segment showing cirrus-sac.

FIG. 3. *Bothriocephalus janickii* sp. nov.: cross-section of the segment showing tocostoma.

tudinal muscles, sometimes slightly overlapping into the lateral fields of the segment. They are about  $25\text{--}30 \times 20 \mu\text{m}$  (Fig. 4). The ovary is a deeply bilobed structure situated in the middle region of the segment. The eggs are  $40\text{--}42 \times 28\text{--}32 \mu\text{m}$ .

There are five species of *Bothriocephalus* occurring in fish-hosts in the Southern Hemisphere. However, the descriptions of some of them are very inadequate (Prudhoe, 1969).

*Bothriocephalus janickii* sp. nov. differs from others quoted by Prudhoe (1969) with its unusually large scolex and extremely slender strobila.

The species is named after the well-known Polish zoologist, the late Professor C. Janicki.

### HYMENOLEPIDIDAE Railliet & Henry, 1909

#### 8. *Hymenolepis prudhoei* sp. nov. Figs 6–14

Host: *Chloephaga picta leucoptera*, rectum. Locality: Teal Inlet—East Falkland, 5.3.1927.

Some sixty-five adult worms were collected. The length of the strobila in these specimens is about 9 cm and the width 4 mm. The scolex is about  $125 \mu\text{m}$  in length and  $137 \mu\text{m}$  in width (Fig. 6). The rostellar sac is unusually long in comparison with the scolex, being about  $187 \mu\text{m}$  in length and  $37.5 \mu\text{m}$  in width.

The rostellum bears a crown of eight hooks, each measuring  $32 \mu\text{m}$ . They have

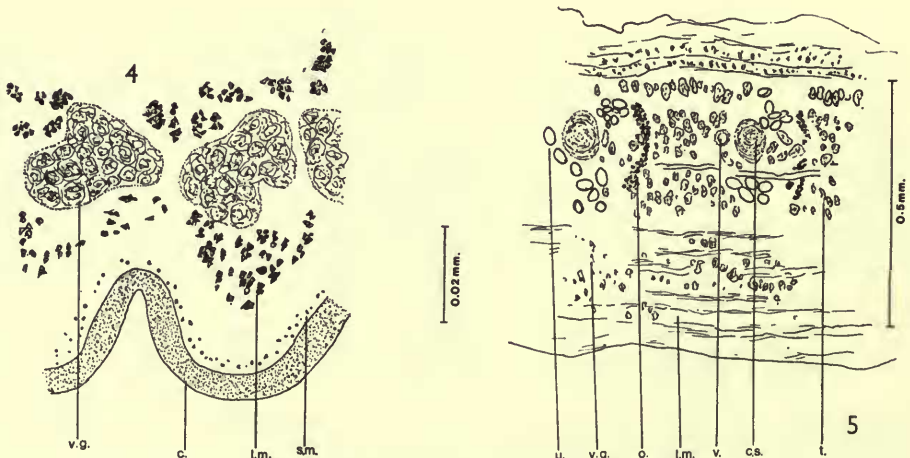


FIG. 4. *Bothriocephalus janickii* sp. nov.: cross-section of the segment showing the arrangement of the longitudinal muscles and vitellaria.

FIG. 5. *Bothriocephalus janickii* sp. nov.: horizontal section of the segment.



a long well-developed blade, and a very thick, club-shaped handle. The guard is weakly developed (Fig. 7). A neck was not observed. The segments are short, elongate transversely.

The three testes,  $270-212 \times 112.5-125 \mu\text{m}$  are situated posteriorly across the segment in a single row (Figs 8 and 14). The vesicula seminalis is large and situated in the anterior region of the segment (Fig. 9). It opens with a coiled duct into the cirrus-sac, which measures about  $130 \mu\text{m}$  in length and  $85 \mu\text{m}$  in width, and is provided with thick muscular walls (Fig. 10).

The cirrus is armed with a smooth stylet, which may be observed protruding from the genital opening.

The ovary is more or less rounded and connected with the ramifying uterus, which in the gravid segments occupies the whole proglottis. The embryo is enclosed in two membranes. The size of the outer membrane of the egg is  $45 \times 40 \mu\text{m}$ , the inner membrane is  $37 \times 28 \mu\text{m}$  and the embryo itself  $20 \times 28 \mu\text{m}$  (Fig. 13). Embryonic hooks were not observed.

The longitudinal muscles are well developed and form two layers, of these the outer one is more strongly developed (Fig. 12).

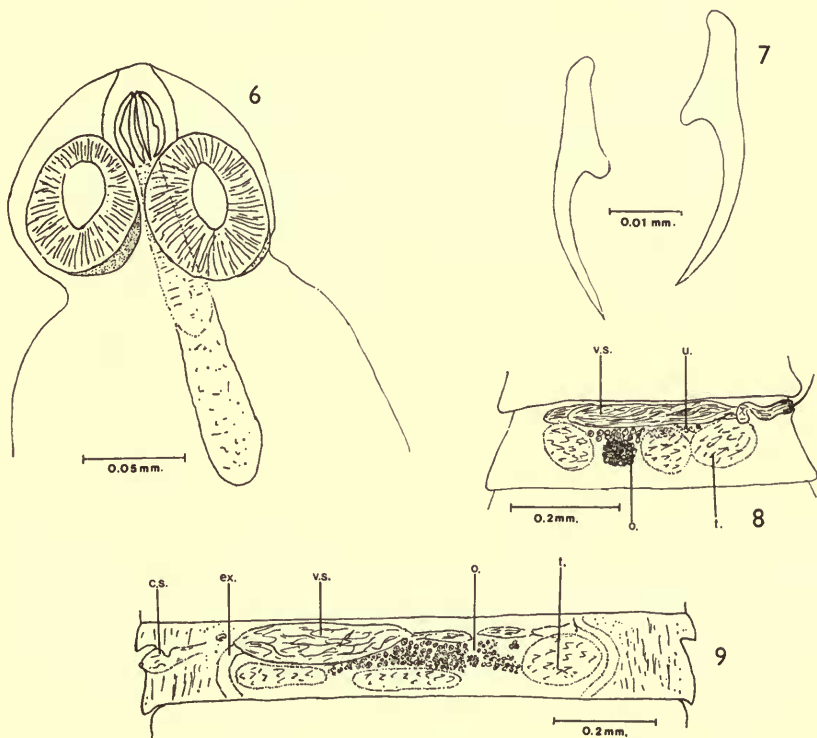


FIG. 6. *Hymenolepis prudhoei* sp. nov.: scolex.

FIG. 7. *Hymenolepis prudhoei* sp. nov.: hooks.

FIG. 8. *Hymenolepis prudhoei* sp. nov.: mature proglottis.

FIG. 9. *Hymenolepis prudhoei* sp. nov.: horizontal section of mature proglottis.

*Hymenolepis prudhoei* sp. nov. which in some features may be compared with *H. bisaccata* Fuhrmann, 1906, *H. octacantha* (Krabbe, 1869) and *H. philactes* Schiller, 1951, differs in the shape and size of the hooks, which in *H. bisaccata* are 37  $\mu\text{m}$  long, and in *H. octacantha* and *H. philactes* 32–40  $\mu\text{m}$  and 31–39  $\mu\text{m}$  respectively. Spasski and Spasskaya (1954) give the size of the hooks in *H. octacantha*: 36–38  $\mu\text{m}$ .

Although there is some similarity between the new form and the other species mentioned, the cirrus-sac is not provided with a *saccus accessorius*, whilst the stylet is smooth and the shape of the testes is also different.

Some Soviet helminthologists, namely Spasski and Spasskaya (1954), Czaplinski (1956), Maksimova (1963), Spasskaya (1966) have erected several new genera by breaking down the genus *Hymenolepis* Weinland (*sensu lato*).

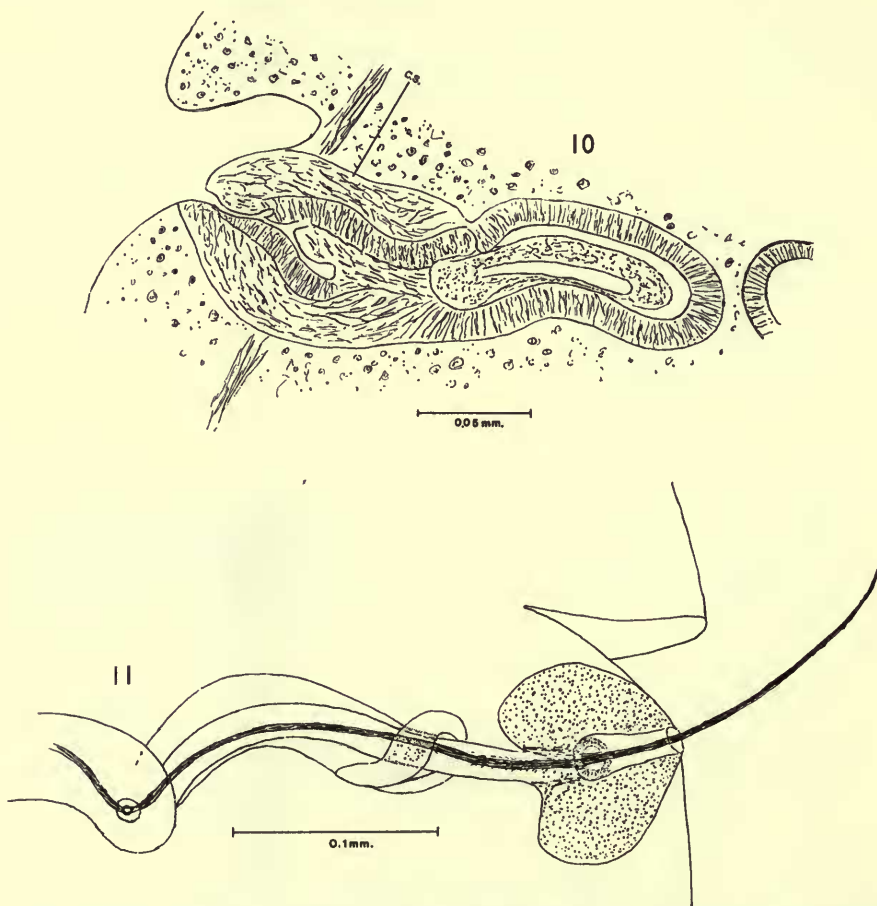


FIG. 10. *Hymenolepis prudhoei* sp. nov.: horizontal section of the cirrus-sac.

FIG. 11. *Hymenolepis prudhoei* sp. nov.: male copulatory apparatus.

As the erection of these new genera does not seem to have produced a clearly understood and concise classification of the species of *Hymenolepis* (*sensu lato*), Weinland's genus in the sense of Fuhrmann's (1932) is here accepted.

From the available literature, it seems, that the cestodes recorded from *Chloephaga picta leucoptera* do not include the form described above. Avery (1966) gives a list of parasitic worms found in this host, but this list is based entirely upon infestation acquired under artificial conditions at Slimbridge, Gloucestershire, where the birds are kept in captivity.

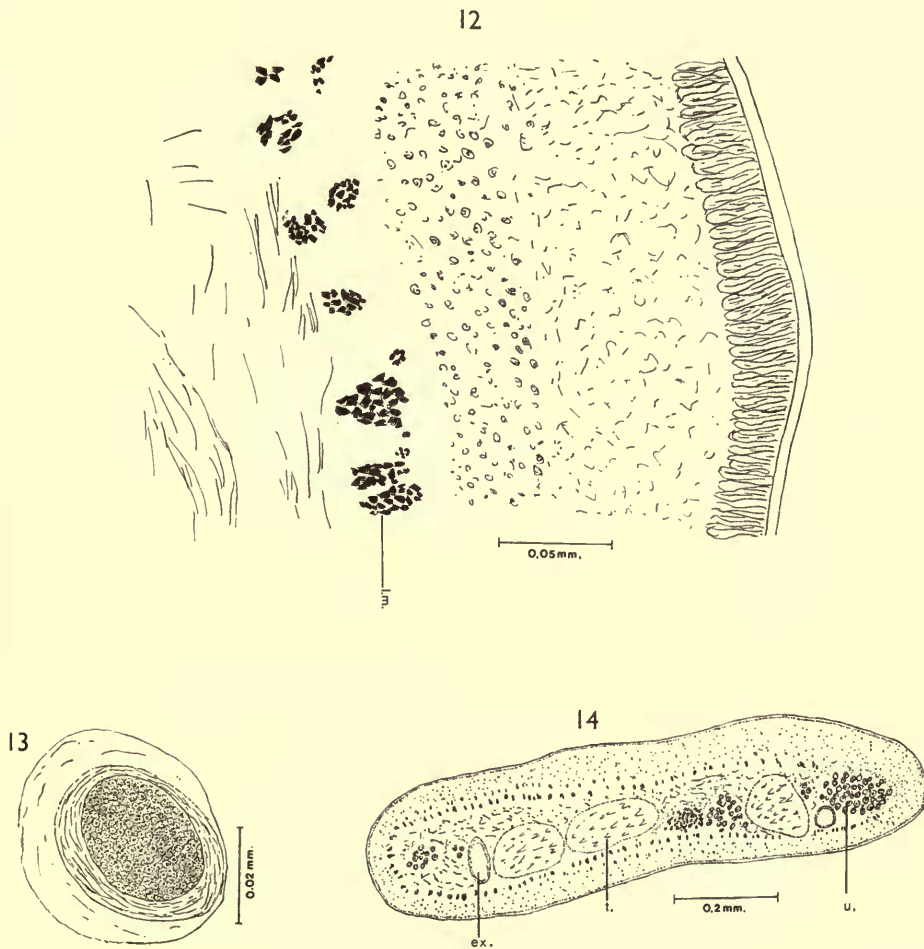


FIG. 12. *Hymenolepis prudhoei* sp. nov.: transverse section of the segment showing the arrangement of longitudinal muscles.

FIG. 13. *Hymenolepis prudhoei* sp. nov.: egg.

FIG. 14. *Hymenolepis prudhoei* sp. nov.: transverse section of a segment.

## TETRABOTHRIIDAE Fuhrmann, 1908

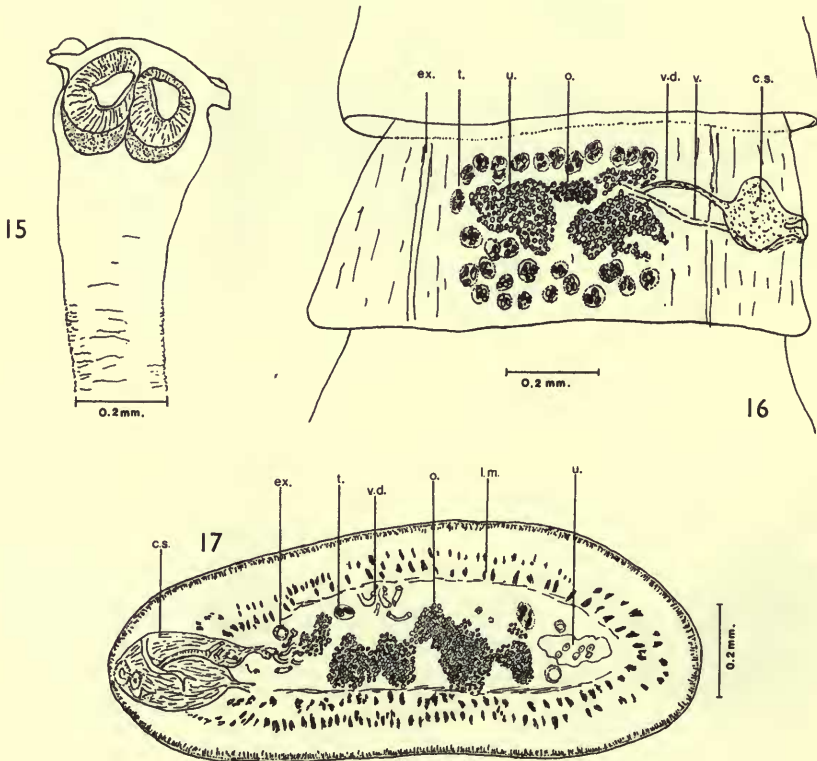
9. *Tetrabothrius heteroclitus* (Diesing, 1850)

(Figs 15-20)

Host: *Phoebetria fusca*: intestine. Locality: Maiviken, West Cumberland Bay, South Georgia 14.12.1926.

Some sixteen complete strobilae and several fragments were collected from the intestine of a sooty albatross.

The length of the strobila is about 18 cm to 20 cm. Its anterior portion is narrow and serrated being about 12 cm in length. The posterior part of the strobila is 2 mm thick, coiled and shows no distinct segmentation. The mature proglottis is 400  $\mu$ m long and 1 mm broad (Fig. 16). The scolex is 290  $\mu$ m long and 330  $\mu$ m wide, and provided with two 'auriculae' (Fig. 15). The width in that part of the scolex is 372  $\mu$ m. The suckers are 290  $\mu$ m long and 175  $\mu$ m across. The longitudinal muscles form two concentric rings. The inner one is more strongly developed (Fig. 19).

FIG. 15. *Tetrabothrius heteroclitus*: scolex.FIG. 16. *Tetrabothrius heteroclitus*: mature segment.FIG. 17. *Tetrabothrius heteroclitus*: transverse section of a mature segment.

The testes, twenty-two to thirty-two, are roundish and situated in the anterior and in the posterior part of the segment, as well as in the aporal region of the proglottis. They are about  $40\ \mu\text{m}$  in diameter (Fig. 16). The vas deferens forms numerous coils. The cirrus-sac is  $152 \times 150\ \mu\text{m}$  in diameter (Figs 17 and 18).

The vagina runs ventrally to the cirrus-sac. The ovary is of an irregular shape. The egg is  $45 \times 37\ \mu\text{m}$  in total diameter. The diameter of the inner membrane surrounding the embryo is  $33 \times 22\ \mu\text{m}$ . The embryo is  $29 \times 20\ \mu\text{m}$ ; the embryonic hooks are  $12\ \mu\text{m}$  long (Fig. 20). From the available literature, it seems that *Phoebetria fusca* is a new host for *T. heteroclitus*.

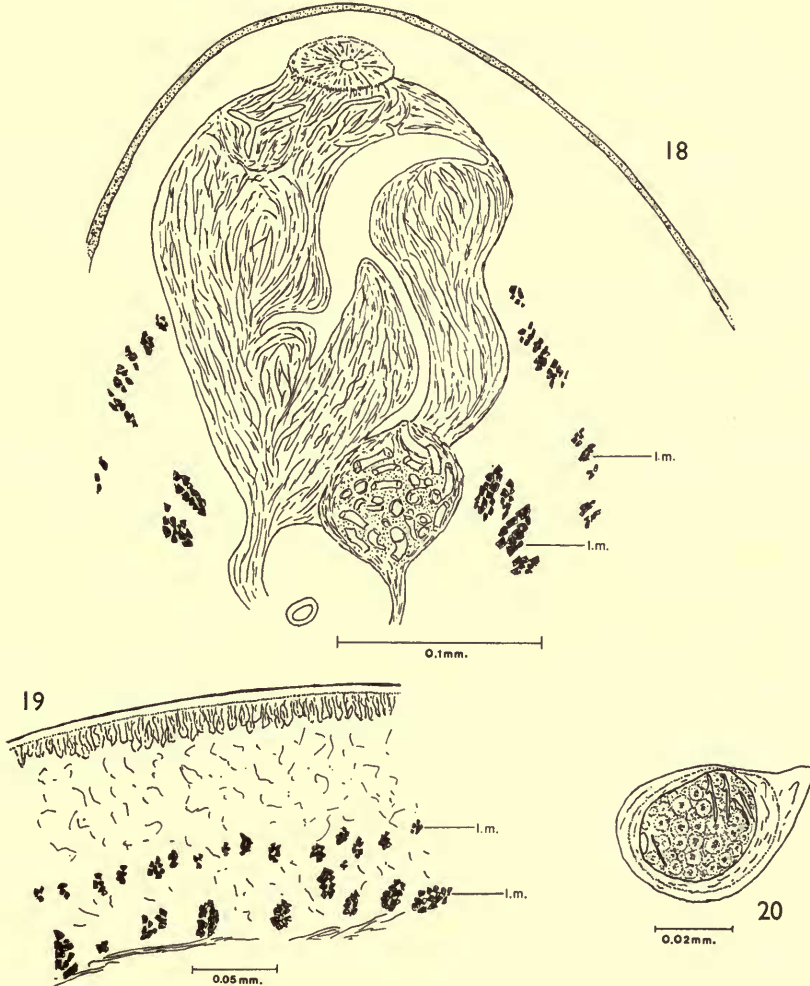


FIG. 18. *Tetrabothrius heteroclitus*: transverse section of a segment showing cirrus-sac.

FIG. 19. *Tetrabothrius heteroclitus*: transverse section of a segment showing the arrangement of the longitudinal muscles.

FIG. 20. *Tetrabothrius heteroclitus*: egg.

## III. NEMATODA

## HETEROICHEILIDAE (Railliet &amp; Henry, 1915)

10. *Contracaecum osculatum* (Rud., 1802)

Host: *Hydrurga leptonyx* and *Leptonychotes weddelli*, intestine. Localities: South Orkneys 16.2.1931; Palmer Archipelago 18.1.1935.

One male and a female specimen were found in the duodenum of *H. leptonyx* and one female in the duodenum of *L. weddelli*.

11. *Contracaecum* sp. (larvae)

Host: *Chaenocephalus aceratus*, liver. Locality: Sandford Bay, South Orkney, 24.1.1933.

Mass infestation of the liver of an ice-fish occurred. Because of their larval condition the specific determination of the nematodes has not been possible.

## IV. ACANTHOCEPHALA

## POLYMORPHIDAE Meyer, 1931

12. *Corynosoma hamanni* (v. Linstow, 1892)

Host: *Notothenia rossi*. Locality: South Orkney 17.2.1931.

Numerous larval stages were found in the mesenteries of the host. Baylis (1929) has given a useful description of this species.

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